

Class-1/2

Ship Construction

Chapter 1: General Arrangement & Standard Terminology of Ship Construction

1. Describe General Arrangement of a Cargo Ship with simple sketch.
2. Draw a simple sketch of a cargo ship and show following:
 - a. Upper deck or main deck
 - b. Forecastle
 - c. Tweendeck
 - d. Tanktop
 - e. Upper hold and lower hold
 - f. Peak tank
 - g. Chain locker
 - h. Bosun's locker
 - i. Collision bulkheads
 - j. Engine room
 - k. Steering machinery
 - l. Double bottom
 - m. Cofferdams
 - n. Superstructure
3. Draw simple diagram and define following:
 - a. Camber
 - b. Rise of Floor
 - c. Tumble Home
 - d. Flare
 - e. Sheer
 - f. Rake
 - g. Entrance
 - h. Run
 - i. Forward Perpendicular
 - j. After Perpendicular
 - k. Length between Perpendiculars
 - l. Length on the designed load waterline
 - m. Length overall
 - n. Base line
 - o. Moulded depth
 - p. Moulded beam

- q. Moulded draught
- r. Extreme beam
- s. Extreme draught

4. Draw simple diagrams of side view and midship section of each and describe following:
 - a. General Cargo Vessel
 - b. Tankers
 - c. Bulk Carriers
 - d. Combination Carriers
 - e. Container Vessel
 - f. Ro Ro Ship
 - g. Passenger Ship
5. Describe types of tankers and what are the conventions used during building a tanker.

Chapter 2: Stress

6. Name six kinds of motions of ship in seaway.
7. Define Hogging and Sagging.
8. Which sea condition give rise to torsion in ship, explain
9. Which structural member resist Racking stress primarily
10. What is pounding? How vessel is strengthened against pounding.
11. List the additional stiffening to resist pounding in longitudinal Framing system
12. Describe Panting arrangements in forward part of a ship.
13. Define sheer stress and Bending moment
14. List the local stresses involved in ship

Chapter 3: Properties of materials

15. What are the properties of steel used in shipbuilding?
16. How Aluminium is connected with steel without corroding?
17. What is HTS, where is it used mostly
18. List the properties of different kind of steel grades.

19. State the areas of ship's hull where high tensile steel plate is used over mild steel? Which authority lays down the specification? Who tests the steel? What is the advantage of this process?
20. What does the term "Notch Tough" imply and how does the notch toughness of steel is determined? Describe and name the test used.
21. Describe advantage of Aluminium Alloy over mild steel. How is Aluminium Alloy tested?
22. Explain how strength is preserved in Aluminium Superstructure in the event of a fire.

Chapter 4: Welding

23. What is Welding? How many types of welding are in use? Define with Suitable sketch Gas Welding, Electro Arc Welding and Thermit Welding.
24. Define butt and fillet welding.
25. What do understand by edge preparation in welding?
26. List the common welding faults.
27. What are the factors that affect the weld quality?
28. Define single pass, multi pass, back run and distortion.
29. What is a backing bar, when is it used?
30. Name the classification society weld tests.
31. Describe the working principle of ultrasonic testing of welds.
32. What are hazards associated with radiographic test?
33. Which structural properties of steel changes after welding?
34. Which flame is suitable for welding steel in gas welding?
35. Describe Destructive and Non Destructive test of Weld Materials.
36. State the requirement of testing and grading of ship building steel and Aluminium alloy.
37. What are the advantages of Aluminium Alloy? Why Aluminium Alloy is used in low temperature gas carrier? Why mild steel are not suitable for low temp gas carrier?
38. What are the precautions for connecting Aluminium alloy to steel work.
39. Show calculation of paint requirement for welded surface area.

Chapter 5: Classification Society

40. What are the purpose of classification societies
41. Name at least five classification societies presently approved.
42. Enumerate some of the interests involved in shipping, which necessitate the need for classification of ships.
43. Write short notes on the following Periodical Classification Surveys, Outline the frequency of such surveys: a) Annual surveys, b) Docking Surveys, c) In-water Surveys, d) Intermediate Surveys and e) Special Surveys.
44. What are the parts of the ship that is examined by a surveyor during an annual survey?
45. Describe the purpose of the docking survey.

Chapter 6: Hull Structure

46. Sketch a duct keel and list the piping and alarm systems there.
47. What are the contents of a piping plan, GA Plan, Capacity Plan, Rigging Plan, Shell Expansion Plan and Midship section plan?
48. What is sheer strake and stringer plate?
49. Why modern ships are using longitudinal girder instead of transverse girder.
50. How the hold frame is connected to the tank top?
51. Distinguish between longitudinal and transverse framing system
52. Define different kinds of keel
53. Distinguish between single bottom and double bottom
54. Describe with Sketch a double bottom tank in Longitudinal framing and Transverse framing system.
What is the function of DB Tank in a ship?
55. What are the purpose of lightening hole
56. Distinguish between deck transverse and deck beam
57. What is the function of gusset plate?

58. Describe how to achieve water tightness in shell plating, tanktop and bulkhead. Describe with sketch how cutting on transverse bulkhead for passing pipelines are compensated.
59. What is floodable length? What is permissible length for passenger ship? What is the factor of subdivision?
60. How Air Pipes and Sounding Pipes are constructed in DBT? What are the procedures for testing the DBT?
61. Why Watertight doors are fitted in a ship? How many types of Watertight door found in a ship? What are the requirements as per solas?
62. What is Type A, Type B & Type C Watertight Door? Give example of Type A Watertight door.
63. List the requirement relation to testing of Watertight Bulkhead, F/peak Tank & Deep tank.
64. Draw and describe a Manhole cover of a DB Tank.
65. How scuppers are constructed on freeboard deck for draining? What are the requirements?

Chapter 7: Hull Structure (Hatch)

66. What is position 1 and position 2 in regard to hatch coaming height
67. Sketch a typical hatch coaming showing the stiffening
68. How the steel hatch cover is made weather tight?
69. Distinguish between weathertight and watertight
70. Name different kinds of hatch cover
71. Describe with sketch a Macgregor Steel Hatch Cover. How is its water tightness maintained?
72. Describe the compensation of Deck Strength in way of hatch coaming.
73. What is bilge keel?
74. How the hull is protected from cracks in case of bilge keel being damaged?
75. What is hopper tank and topside tank? State their purpose.
76. How the container ships are protected against torsion?

Chapter 8: Hull Structure (Midship Section)

77. Draw the midship section of a bulk carrier
78. Draw the midship section of a double hull oil tanker
79. What structural arrangements are taken in oil tankers to resist oil spillage in the event of bilging?

Chapter 9: Hull Structure (Bulkhead)

80. State the purpose/function of Transverse and Longitudinal Bulkheads. Describe the requirement, position and number of bulkheads onboard a ship.
81. What is a Wash Plate/Bulkhead. Why is it fitted in Cargo Tank/Deep Tank? Give example of non watertight bulkhead.
82. What kind of bulkheads are used for reducing free surface effect in wide tanks?
83. What are relative advantages of corrugated bulkhead over plain bulkhead?
84. What is diaphragm plate?
85. How to test a bulkhead which forms a tank boundary?
86. Write short note on collision bulkhead.
87. Why stiffeners are used in plain bulkhead?
88. State the purpose of deep tanks. How deep tank is tested for watertightness?
89. Describe the working principle of sliding watertight doors.
90. Write short note on shaft tunnel

Chapter 10: Bow Structure

91. State the purpose and construction of bulbous bow. What are the functions and advantages of bulbous bow.
92. What are the stiffener spacing in the bulkheads?
93. How the dirt and mud are cleaned in chain locker? What is a false bottom in chain locker?
94. How the bitter end is connected to the chain locker?
95. Describe a clench cable assembly
96. Briefly describe the construction of a chain locker. How the chain is cleaned in the hawse pipe?

Chapter 11: Stern Structure

97. State the purpose of the Stern tube. Describe Stern Tube with suitable supporting sketch.
98. Distinguish between the transom and cruiser stern.
99. What is cant beam and cant frame, where it is used?
100. Sketch the stiffening of a transom stern
101. What is a stern frame? How it is constructed? Sketch a stern frame showing the position of propeller post.

Chapter 12: Rudder

102. Discuss the types of rudder. Why there are named so?
103. What is the most used kind of rudder? What makes it more efficient?
104. Define Pintle and Pintle bearing. Sketch the pintle of rudder & describe the arrangement.
105. Draw a balanced rudder and label the major components.
106. Draw a rudder in the way of stuffing box. How the weight of rudder is suspended and the stuffing box is made watertight?
107. How rudder is tested for water tightness and leak?
108. Discuss the construction of rudder carrier with a neat sketch

Chapter 13: Propeller

109. Distinguish between a right and left handed propeller
110. How a right handed propeller can be recognized at stationary condition?
111. Define Pitch, rake and skewness of propeller blade
112. What is wheel effect?
113. Distinguish between a fixed pitch and controllable pitch propeller
114. Discuss the relative advantages and disadvantages of a CPP and FPP

115. How the oil lubricated sterntube is kept oil tight?
116. Name the seals in the sterntube and their respective functions
117. What is white metal and gun metal? Where it is being used?
118. What is cavitation? Which component of the ship is subjected to it? What can be done to reduce cavitation?
119. Discuss the SOLAS requirements of a watertight door.

Chapter 14: Fire Protection

120. What is structural fire protection? What are the measures taken during construction of a ship for fire protection?
121. Describe the fire main system of your last ship
122. What is meant by A-60 class division?
123. A plain stiffened bulkhead falls under which category of class division?
124. What requirements are to be fulfilled by fire hydrants, fire hoses and fire pumps?
125. Write a short note on International shore connection (ISC)
126. What should be the minimum capacity of emergency fire pump?
127. What are SBT and CBT?

Chapter 15: Corrosion

128. What is corrosion? What are the causes of corrosion? How to protect following from corrosion:
 - a) Ballast tank, b) Cargo tank, c) Cargo Hold, d) Chain Locker, e) Hopper tank, f) Cofferdam, g) Refer Cargo Space
129. What are factors affecting corrosion?
130. What is erosion? Where will you find erosion in a ship?
131. Discuss the sacrificial anode system to resist corrosion.
132. What is cathodic protection? Describe the metals that can be used as anode.

133. What is ICCP system? Why reference electrode is needed? What are the advantages and disadvantages of ICCP system? State the effect of using a too high current in the system.
134. What are components of conventional and binary paints? Which one is more convenient for ship?
135. What are the ingredients of paint and state their purpose.
136. What is fouling? Discuss the antifouling system incorporated on the modern ships.
137. What are the effect of anti fouling system on SOX and NOX emission

Chapter 16: Outfitting

138. Discuss the types of fairleads.
139. Distinguish between bollards and bitts.
140. What do you mean by SWL and WLL? Why are they important to consider during mooring operation?
141. What are the functions of chain stopper?
142. Describe with suitable sketch how you construct Tanker & Gas Carrier hatchway.

Chapter 17: Bilge and Ballast System

143. List the functions of bilge and ballast pumps.
144. State the number of bilge pumps required on board ships.
145. Sketch a typical bilge and ballast lines arrangement on board a general cargo ship with machinery space amidships.
146. State the need of a strum box, mud box and non-return valve.
147. Sketch and describe the strum box, mud box and non-return valve.
148. State the requirements relating to location, size and construction of strum boxes.
149. Describe the requirements relating to air pipes and sounding pipes, with respect to their purpose, location, size and detail of their construction.
150. State the need of an oily water separator.
151. State the contents of the capacity plan, docking plan and the shell expansion plan.

152. What is permeability? How to find sinkage of ship for bilging a midship compartment?

Chapter 18: Load Lines

153. Draw the Load line markings of a vessel issued with a Timber Load line certificate, indicating the various dimensions.

154. State the various types of freeboards assignable to ships.

155. Outline the requirements relevant to the Conditions of assignment of freeboards under the International Load line regulations.

156. Under the International Load line regulations, define the Type 'A' and Type 'B' vessel. Describe damage withstand criterion of Type A vessel which is more than 150m length. Describe the survivability of Type B vessel. Why there are difference in assigned freeboard of same length of Type A and Type B vessel.

157. Explain how freeboard is assigned for a type 'A' ship.

158. Why Oil Tankers have less freeboard than bulk carriers?

159. Explain the conditions under which a type 'B' ship may be assigned a Reduced freeboard.

160. What are the contents of Safe Practice for ships carrying timber deck cargo. Describe IMO intact stability criterion for T.D.C.

161. Sketch and describe the structural elements that are incorporated in the construction of a ship designed to carry Timber Deck Cargo.

Chapter 19: Docking, Survey & Certification

162. List the six items to be checked in Dry Dock

163. Describe the contents of a docking plan.

164. Describe preparation for Safety Equipment Renewal Survey.

165. Describe how you will prepare your ship for Safety Construction Survey.

166. Describe preparation for Loadline Survey.

167. Describe preparation for Special Survey.

168. What are the intervals for Docking Survey, Special Survey, Under Water Survey, Intermediate Survey, Continuous Survey & Renewal Survey?

169. What do you understand by COS and CAP?

170. Define harmonized system of Survey and Certification.

171. Describe Enhanced Survey Program.

172. Describe the strengthening requirement for Ice Navigation.